PATENT SPECIFICATION

DRAWINGS ATTACHED

847,469

Inventors: JOHN ROBERT BAYSTON and THOMAS LEONARD KNEBLER.

Date of Application and filing Complete Specification: May 16, 1958.
No. 42295/59.
(*Divided on* 847,468).
Complete Specification Published: September 7, 1960.

Index at Acceptance:—Class 29, D(2:7A:7C:7E:12).
International Classification:—F25c.

COMPLETE SPECIFICATION

ERRATUM

SPECIFICATION NO. 847,469

Page 1 in the heading Inventors *for* "Thomas Leonard Knebler" *read* Thomas Leonard Knebler.

THE PATENT OFFICE,
20th February, 1961

DS 87538/1(11)/R.153 200 2/61 PL

suit particular requirements, the units being arranged to operate independently of each other yet to discharge the ice produced into a common bin.

With this object in view, there is provided according to the present invention an ice making machine comprising a plurality of substantially identical automatic ice making units disposed one above the other, each of the said units having a water freezing chamber, a vertical ice chute extending completely through the unit, and means for delivering ice frozen in the said freezing chamber into the said chute whereby ice manufactured in the unit or units can be delivered through the chute or chutes of the unit or units positioned therebelow, so that the ice produced by both or all the units can be accumulated in a single bin.

A preferred embodiment of the invention will now be described with reference to the accompanying drawings, in which:

Figure 1 is a front perspective view of an ice making machine according to the present invention having two ice making units, the cabinet of the machine being shown with the ice bin open,

Figure 2 is a front elevation of the machine shown in Figure 1 with the front cover plates removed to show the internal mechanism,

Figure 3 is a central sectional view of the insulating material (not shown) in known manner. The front of the machine is provided with an insulated door 16, hinged at 17, and provided with a latch (not shown). The interior of the base 10 constitutes an ice bin having a pivotally mounted front plate 18 adapted to be engaged by brackets 19 on the inner face of the door 16, so that the front plate 18 of the ice bin will be tilted to give easy access to the ice cubes contained in the bin when the door 16 is opened. Adjustable legs 21 are provided on the base 10 to enable the machine to be levelled when resting on an uneven floor surface.

Each of the individual freezing units 11 of the machine has a pair of end walls 22, a back wall 23, and a front panel 24, similar in size and shape to the corresponding parts of the base 10. The units 11 are adapted to rest in interlocking relation one upon another, or upon the base 10, with their corresponding walls flush with each other. The interlocking of the units or of the lowermost unit with the base 10 prevents relative lateral movement of the units, or of the lowermost unit and the base 10. Each unit 11 has a partition 26, dividing the unit into an evaporator housing 27 at one end of the unit and a compressor housing 28 at the other end. The housing 28 encloses the refrigeration equipment and the housing 27 encloses the freezing chamber, ice

[Price 3s. 6d.]

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COMPLETE SPECIFICATION

Ice making machine

I, JOHN ROBERT BAYSTON, a citizen of the United States of America, of 14208, Dickens Avenue, Sherman Oaks, California, United States of America, do hereby declare the invention, for which I pray that a patent may be granted to me, and the method by which it is to be performed, to be particularly described in and by the following statement:—

The present invention relates to ice making machines and has for its object to provide an improved automatic ice making machine wherein one, two, three or more individual ice making units may be assembled to make up a machine with an ice-making capacity to suit particular requirements, the units being arranged to operate independently of each other yet to discharge the ice produced into a common bin.

With this object in view, there is provided according to the present invention an ice making machine comprising a plurality of substantially identical automatic ice making units disposed one above the other, each of the said units having a water freezing chamber, a vertical ice chute extending completely through the unit, and means for delivering ice frozen in the said freezing chamber into the said chute whereby ice manufactured in the unit or units can be delivered through the chute or chutes of the unit or units positioned therebelow, so that the ice produced by both or all the units can be accumulated in a single bin.

A preferred embodiment of the invention will now be described with reference to the accompanying drawings, in which:

Figure 1 is a front perspective view of an ice making machine according to the present invention having two ice making units, the cabinet of the machine being shown with the ice bin open,

Figure 2 is a front elevation of the machine shown in Figure 1 with the front cover plates removed to show the internal mechanism,

Figure 3 is a central sectional view of the machine shown in Figure 2, and

Figure 4 is a plan view of one of the ice-making units with the cover removed.

The machine has a base 10 upon which two freezing units of identical construction are stacked. Additional freezing units may be included if desired. A cover 12 is provided to go on top of the upper unit 11. The arrangement is such that the ice produced in the upper unit 11 can be discharged through the lower unit into a bin in the base 10.

The base 10 comprises a pair of end walls 13, a back wall 13 and a bottom wall 15 (Figure 3) all of which are lined with thermal insulating material (not shown) in known manner. The front of the machine is provided with an insulated door 16, hinged at 17, and provided with a latch (not shown). The interior of the base 10 constitutes an ice bin having a pivotally mounted front plate 18 adapted to be engaged by brackets 19 on the inner face of the door 16, so that the front plate 18 of the ice bin will be tilted to give easy access to the ice cubes contained in the bin when the door 16 is opened. Adjustable legs 21 are provided on the base 10 to enable the machine to be levelled when resting on an uneven floor surface.

Each of the individual freezing units 11 of the machine has a pair of end walls 22, a back wall 23, and a front panel 24, similar in size and shape to the corresponding parts of the base 10. The units 11 are adapted to rest in interlocking relation one upon another, or upon the base 10, with their corresponding walls flush with each other. The interlocking of the units or of the lowermost unit with the base 10 prevents relative lateral movement of the units, or of the lowermost unit and the base 10. Each unit 11 has a partition 26, dividing the unit into an evaporator housing 27 at one end of the unit and a compressor housing 28 at the other end. The housing 28 encloses the refrigeration equipment and the housing 27 encloses the freezing chamber, ice

[Price 3s. 6d.]

making apparatus and control devices.

The freezing apparatus employed in each freezing unit 11 of the embodiment is the same as that described in co-pending Patent Application No. 15886/58 (Serial No. 847,468) and includes a compressor 29, an evaporator 31 and a condenser 32.

The evaporator 31 comprises a top plate 36 (Figure 3) on the underside of which are located a plurality of cube-shaped freezing cells 38, having their lower ends open. These open ends are closed during the freezing cycle of the machine by a plastic water plate 42 arranged for pivotal movement on pins 43. Pivotal movement of the plate 36 is effected by means of a motor 44 (Figure 4) which is arranged to drive a shaft 45 through reduction gearing. The shaft 45 has secured to it a pair of arms 46 connected to springs 47 which are also connected to studs 48 on a frame 49 carrying the plate 42.

When the motor 44 is operated to swing the arms 46 upwardly (position A in Figure 3), the springs 47 hold the plate 42 resiliently against the bottom edges of the walls of the freezing cells 38. When the motor is operated in the reverse direction the plate 42 is lowered (position B in Figure 3) and any ice cubes in the freezing cells 38 are released.

Each unit 11 is provided with a pipe 33 to supply the water necessary for the production of ice and to provide auxiliary water cooling for the refrigerant. The pipe 33 is connected to a feed pipe 34 through a solenoid actuated valve 35, and it discharges on to the plate 36 of the evaporator 31. The plate 36 has a plurality of perforations 37 (Figure 4) which permit water to flow into the individual freezing cells 38, the water being pre-cooled as it passes through the cells 38 through return holes (not shown) in the plate 42 and into the tank 41.

The water supply pipe 33 is also connected through a feed pipe 51 (Figure 4) to a pressure controlled valve 52 and thence to the tube 53 in an auxiliary water cooled heat exchanger 54 (Fig. 2). The water delivered to this heat exchanger through the pipe 51 passes through an outlet pipe 55 into a drain pan 56 (Figure 3) disposed below the freezing unit, and thence through a drain tube 57 to the drain connection of the machine. The valve 52 is operated in response to refrigerant pressure, and to this end it is connected to a reservoir 61 for the refrigerant through a pipe 62. The valve 52 is set so that it opens and supplies cold water to the auxiliary cooler 54 whenever the pressure in the reservoir 61 reaches a predetermined limit.

The ice bin 14 of the machine has a drain aperture in the bottom wall 15 from which a drain tube 63 extends downwardly and laterally into a drain trap 64. The top of the trap 64 is open, and the trap is connected to a sewer by an outlet duct 65 in the vertical wall of the trap above the outlet of the tube 63. Any water drained from the ice cubes in the bin 14 will flow into the trap 64 and thence through the outlet duct 65, but the possibility of contamination of the ice due to a defective sewer connection is eliminated, since any back flow will merely overflow the trap 64 without permitting a reverse flow through the tube 63 into the ice bin.

The dreg water and the water used by the auxiliary heat exchanger 54 are discharged into the drip pans 56 of the individual freezing units. These drip pans are connected to the drain through the tube 57 which enters the open top of the trap 64 and has its extreme end portion 66 bent to enter the outlet duct 65. This brings about a venturi action in the drain pipe 65 when water flows out of the tube 57 ensuring free flow of liquid from the trap 64 to the sewer. The tube 57 is provided with as small aperture 67 within the trap 64 in order that some of the relatively warm water normally discharged from the tube 57 mixes with and dilutes the colder water received from the ice bin through the tube 63. In this way the average temperature of the water in the trap is kept high enough to eliminate any condensation of moisture or "sweating" on the exterior surfaces of the trap and drain.

In the freezing operation, a predeterminal volume of water is supplied to the tank 41 and this water is continuously cooled and recirculated through the evaporator 31 until enough water to make one batch of ice cubes is completely frozen in the freezing cells 38. The remaining water (dreg water) is then automatically flushed from the tank 41 into the drain trap 64. This arrangement ensures that impurities, e.g., minerals in the water are concentrated in the dreg water and do not contaminate the ice. Thus the machine will produce crystal clear ice cubes having no perceptible colour or cloudiness.

The recirculation system and the control mechanism of each unit 11 are the same as those described in greater detail in co-pending Patent Application No. 15886/58 (Serial No. 847,468).

When a batch of ice cubes has been frozen, the evaporator coils are automatically heated and the plate 42 is tilted as at B in Figure 3 with the result that the ice cubes are released from the freezing cells 38. It is desirable to maintain a thin connecting layer of ice between the individual cubes so that the weight of the entire batch of ice cubes is imposed on any few cubes which may be slow to release themselves. Thus the batch of cubes will fall from the freezing cells 38 together and will break up on striking the plate 42. From the plate 42, the ice cubes are discharged downwardly and laterally into the ice bin in the base 10 of

the machine, through an ice chute 71 in the bottom of each unit 11. The arrangement is such that the cubes discharged into the chute of an upper unit 11 will fall through the ice chute of any lower unit and hence into the ice bin in the base 10. Dreg water and water formed by the heating of the evaporator 31 will be directed by deflectors 72 into the drip pans 56.

With this arrangement any number of individual freezing sections may be stacked one upon another to form an assembly of ice making units feeding one common ice bin at the bottom of the stack. An assembly having any required capacity can thus be conveniently built up. Since the operation of each unit is independent of the operation of the other units, this form of machine is not as subject to breakdown as other types in which malfunction of any one portion of the machine puts the entire machine out of order.

WHAT I CLAIM IS:—

1. An ice making machine comprising a plurality of substantially identical automatic ice making units disposed one above the other, each of the said units having a water freezing chamber, a vertical ice chute extending completely through the unit and means for delivering ice frozen in the said freezing chamber into the said chute, the arrangement being such that ice manufactured in the upper unit or units can be delivered through the chute or chutes of the unit or units positioned therebelow, whereby the ice produced by both or all the units can be accumulated in a single bin.

2. An ice making machine as claimed in claim 1, wherein each of the ice making units has a complete and separate refrigeration system including a compressor, condenser, and evaporator; the water freezing chamber is disposed beside the ice chute; and the means for diverting ice into the chute is arranged to divert said ice in a downward and lateral direction into said chute.

3. An ice making machine as claimed in claim 1, or 2, wherein each of the ice making units, except the lowermost one, rests directly upon and is supported in interlocking relation with the top of the ice making unit directly below it.

4. An ice making machine as claimed in claim 3, wherein the lowermost ice making unit is adapted to rest directly upon the top of the said single bin which corresponds in size and shape with said ice making unit and is provided with an access door in the front and an ice inlet opening in the top through which ice produced by all the ice making units is adapted to be discharged into it.

5. An ice making machine as claimed in claim 4, wherein the lowermost ice-making unit is supported in interlocking relation with the top of the bin in such a manner as to prevent lateral displacement between said bin and said lowermost ice-making unit.

6. An ice making machine as claimed in claim 4 or 5, wherein the bin has a drain conduit leading to the lower portion of a cold water drain receptable which is open to the atmosphere and which has an outlet drain above the level of the discharge end of said tube.

7. An ice making machine as claimed in claim 6, wherein a separate water discharge conduit is directed into the outlet drain to create a venturi effect therein when water is discharged through the said separate discharge conduit.

8. An ice making machine as claimed in claim 7, wherein the separate water discharge conduit is connected at its inlet end to a source of warm dreg water and is formed with a dilution port discharging into the drain receptacle to permit at least a portion of the relatively warm dreg water to become mixed with the cold water from the ice bin to reduce moisture condensation on the drain receptacle.

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847,469 COMPLETE SPECIFICATION
3 SHEETS
This drawing is a reproduction of the Original on a reduced scale.
SHEET 1

Fig. 4.

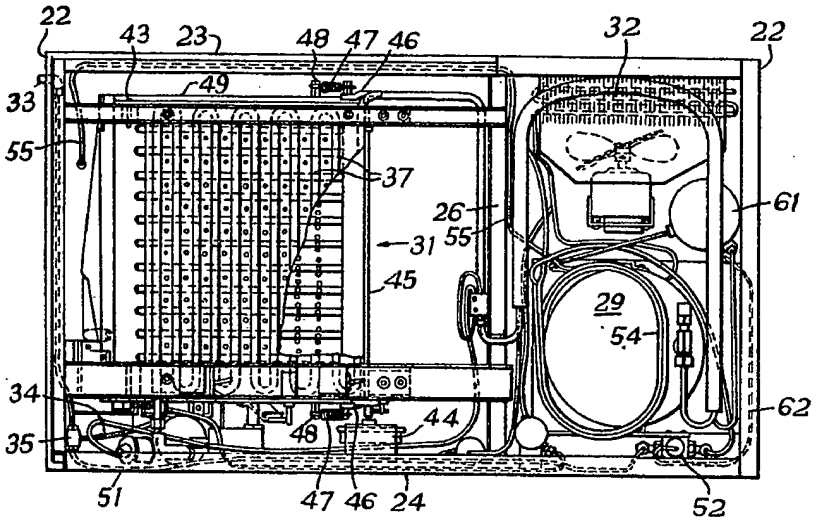


Fig. 1.

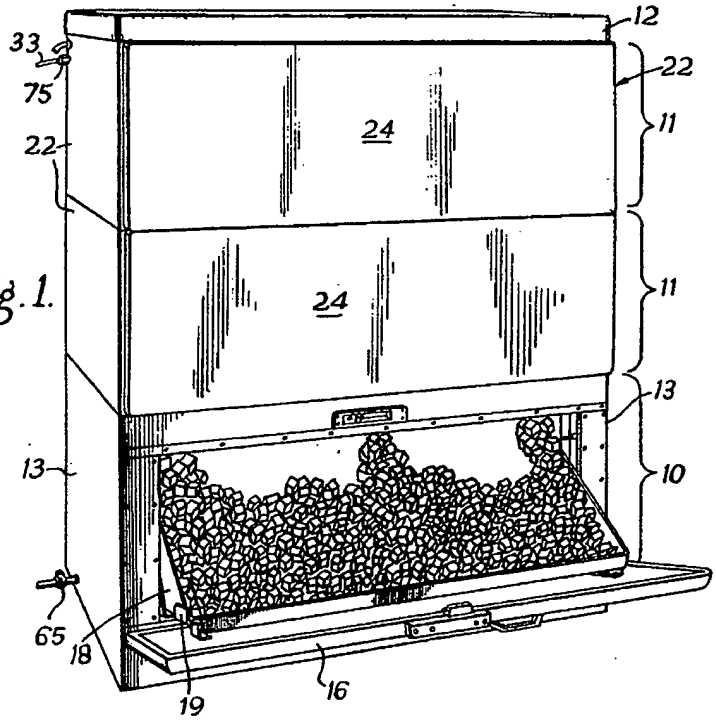
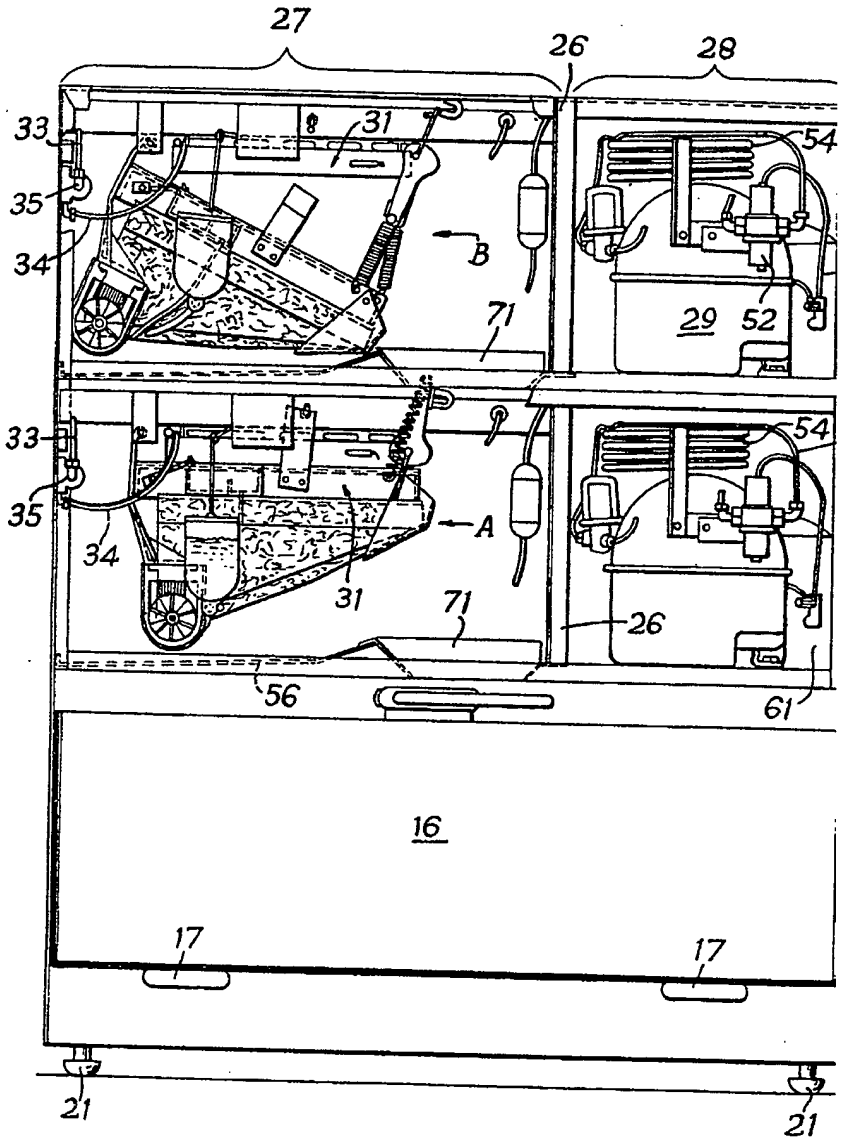


Fig. 2.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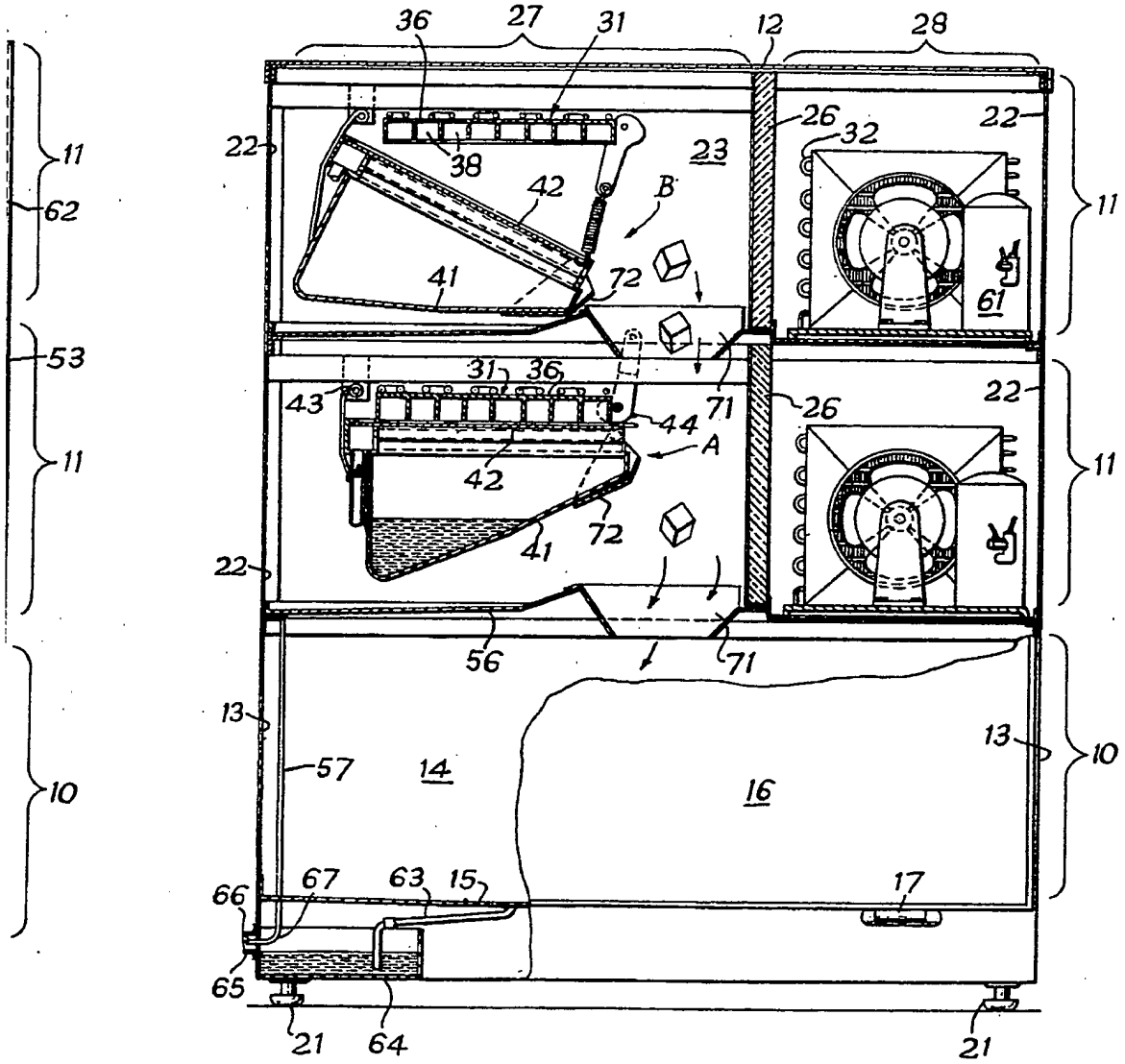
3 SHEETS

Fig. 3.



847,469 COMPLETE SPECIFICATION
3 SHEETS This drawing is a reproduction of the Original on a reduced scale.
SHEETS 2 & 3

Fig. 2.

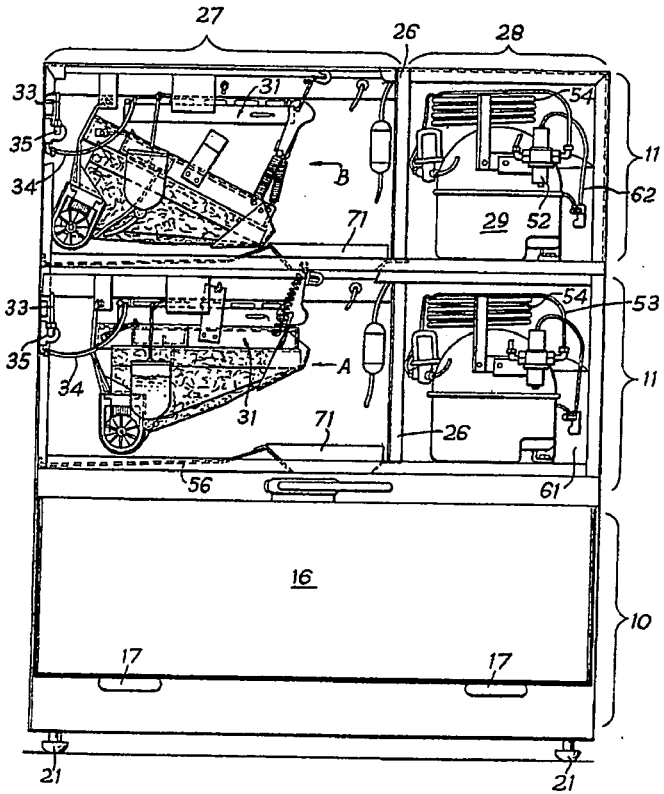


Fig. 3.